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EXAMINER	
DHINGRA, RAKESH KUMAR	
ART UNIT	PAPER NUMBER
1792	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/787,204	NOZAWA ET AL.	
	Examiner	Art Unit	
	RAKESH K. DHINGRA	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *19-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *2/27/04* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Claims 19-30 are presently pending and active.

Further, applicant's arguments filed 4/23/09 have been fully considered but they are not persuasive as explained hereunder.

1) Applicant has argued that as per office action (page 3, II, 19-20) Fukuda et al do not teach that during cleaning the inside of said process chamber is evacuated by a second exhaust port positioned lower than said first exhaust port in said process chamber.

Examiner responds that Lee et al teach a first and second exhaust ports 60, 58 (Fig. 4), where the second exhaust unit 58 is positioned lower than the first exhaust port 60, and is used for evacuating mainly around the susceptor 66 in said process chamber. Also the gas during plasma processing would be evacuated from the second exhaust unit 58 also (claim does not limit use of a second exhaust port during plasma processing). Further, though Lee et al do not explicitly teach, the gas during cleaning process would be exhausted from second exhaust port 58 (that is located lower than the first exhaust port 60), {e.g. Fig 4 and col. 5, line 40 to col. 8, line 20}. Additionally the gas during cleaning would be exhausted from the first exhaust port also [examiner notes that claim 19 does not limit use of first exhaust port for evacuation, during cleaning operation].

2) Applicant further argues that *Lee* does not teach one equivalent process to the process of "introducing the cleaning gas into [a] process chamber while the inside of said process chamber is evacuated by a second exhaust port positioned lower than [a] first exhaust port in said process chamber." Accordingly, *Lee* also fails to teach or suggest, "introducing ... a cleaning gas into [a] process chamber while the inside of said process chamber is evacuated by a second

exhaust port positioned lower than [a] first exhaust port in said process chamber," as recited in claim 19.

Examiner responds that though Lee does not explicitly teach generation of plasma during processing, he does teach creation of an electric field between electrodes 62, 69 by application of RF power through RF source 82, which would ionize the gas in the chamber 52 (col. 6, lines 21-35). It would be obvious to use plasma processing for processing the substrate as an alternate known process depending upon process limitations like, type of gas and the type of reaction products to be removed from the chamber, and exhaust the reaction products through the second exhaust port of Lee et al in view of teaching of Fukuda et al to improve the cleaning of process chamber during cleaning process. Further, as explained above Lee teaches that the gas during cleaning process would be exhausted from second exhaust port 58 (that is located lower than the first exhaust port 60), {e.g. Fig 4 and col. 5, line 40 to col. 8, line 20}[examiner notes that claim 19 does not limit use of first exhaust port for evacuation, during cleaning operation]. Additionally, though not taught explicitly, it would be obvious to supply cleaning gas concurrently with the evacuation of the chamber during plasma processing, unless taught to the contrary, to maintain desired pressure in the processing chamber besides avoid over pressurizing in the process chamber during plasma processing. It would have been obvious to introduce process gas into the process chamber while an inside of said process chamber is evacuated by first exhaust port, as taught by Fukuda et al in the apparatus of Lee et al to enable deposit the film on the substrate, as per required process parameters like, gas flow rate, chamber pressure and power etc.

3) Applicant further contends that as per office action "Zhao et al teach a method of cleaning.., a CVD chamber 102 wherein during the cleaning operation 212 the process chamber

is evacuated to exhaust the deposits that are transformed into volatile compounds by the cleaning " *(Office Action,* p. 5, 11.13-15), such teaching, even if present in *Zhao,* fails to teach or suggest, "introducing •.. a cleaning gas into [a] process chamber while the inside of said process chamber is evacuated by a second exhaust port positioned lower than first exhaust port in said process chamber," as recited in claim 19.

Examiner responds that Zhao et al teach a method of cleaning a cleaning a CVD chamber 102 wherein during the cleaning operations 208-214 (Fig. 2), while the cleaning gas is supplied, the process chamber is evacuated through vacuum pump to maintain desired gas pressure in the process chamber 102 (e.g. Figs. 1, 2 and para. 0028, 0052). It would be obvious to introduce the cleaning gas into the process chamber while an inside of said process chamber is evacuated by second exhaust port in the apparatus of Lee et al in view of Fukuda et al to maintain desired gas pressure desired gas pressure in the process chamber. Examiner further notes that unless taught to the contrary, it would be obvious to supply process gas concurrently with the evacuation of the chamber during plasma processing, to maintain desired pressure in the process chamber, besides avoid any over pressurizing in the process chamber during plasma processing. In view of above, Lee et al in view of Fukuda et al and Zhao et al teach claim all limitations of claim 19 including introducing, "after said substrate is plasma-processed, a cleaning gas into said process chamber while the inside of said process chamber is evacuated by a second exhaust port positioned lower than said first exhaust port in said process chamber, thereby cleaning the inside of said process chamber", and the rejection is maintained. Further, in view of above, rejection of balance claims 20-30 is also maintained as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 19, 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 6,857,388) in view of Fukuda et (US 5,449,411) and Zhao et al (US 2004/0144490).

Regarding Claim 19: Lee et al teach a method for processing a substrate comprising:

delivering a substrate 64 to be plasma-processed into a process chamber 52;

introducing a process gas (through gas supply unit 54) into said process chamber after an inside of said process chamber was evacuated by a first exhaust port 60) in said process chamber;

plasma-processing said substrate 64 (using RF source 82 and electrodes 62, 69); and

introducing after said substrate is plasma-processed, a cleaning gas (like SF6) into said process chamber 52 for generating a plasma in the chamber (the inside of the chamber would be normally evacuated during plasma processing) and evacuating the inside of chamber by a second exhaust unit 58 (since the second exhaust unit 58 is positioned lower than the first exhaust port 60, and would be used for evacuating mainly around the susceptor 66) in said process chamber {e.g. Fig 4 and col. 5, line 40 to col. 8, line 20}[examiner notes that claim 19 does not limit use of first exhaust port for evacuation, during cleaning operation].

Lee et al do not explicitly teach the substrate is processed by plasma processing and the second exhaust port is used for evacuating the inside of the process chamber during process chamber cleaning.

Fukuda et al teach a method for processing a substrate comprising:

delivering a substrate 1 to be plasma-processed into a process chamber 5;

introducing a process gas (through process gas conduits 6, 7) into said process chamber while an inside of said process chamber is evacuated by a first exhaust port 9 in said process chamber;

plasma-processing said substrate 1; and

introducing, after said substrate is plasma-processed, a cleaning gas (through a cleaning gas conduit 8) into said process chamber 5 while the inside of said process chamber is evacuated (since chamber cleaning is performed by plasma processing and the chamber is normally evacuated during such operation) by an exhaust port thereby cleaning the inside of said process

chamber. Fukuda et al also teach that the invention improves the cleaning of chamber in the chamber portion around the substrate holder and such reaction products that adhere to the chamber wall during film deposition are removed and exhausted through exhaust port 9 disposed near a bottom wall of the process chamber (e.g. Figs. 1, 2. and col. 4, line 35 to col. 6, line 40). Further, Though Lee does not explicitly teach that plasma is generated during cleaning, Lee et al does teach that an RF electric field is established in the chamber, which would obviously ionize the gas there. It would be obvious to use plasma processing for processing the substrate instead of thermal deposition as an alternate known depending upon process limitations like type of gas and the type of reaction products to be removed from the chamber, and exhaust the reaction products through the second exhaust port of Lee et al in view of teaching of Fukuda et al to improve the cleaning of process chamber during cleaning process.

In this regard courts have ruled:

An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout,* 675 F.2d 297, 213 USPQ 532 (CCPA 1982).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to use the second exhaust port for evacuating the process chamber during cleaning process as taught by Fukuda et al in the apparatus of Lee et al to enable effectively remove the plasma reaction products especially the chamber portion surrounding the susceptor.

Lee et all in view of Fukuda et al do not explicitly teach that cleaning gas is introduced into process chamber while an inside of said process chamber is evacuated by second exhaust port.

Zhao et al teach a method of cleaning a cleaning a CVD chamber 102 wherein during the cleaning operation 212 the process chamber is evacuated to exhaust the deposits that are transformed into volatile compounds by the cleaning gas (e.g. Figs. 1, 2 and para. 0052).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to evacuate the process chamber during the cleaning process as taught by Zhao et al in the apparatus of Lee et al in view of Fukuda et al to enable to exhaust the deposits that are transformed into volatile compounds by the cleaning gas.

Regarding Claim 22: Lee et al teach that inside of process chamber can be exhausted by the first and second exhaust ports 58, 60 when cleaning gas is introduced in the processing chamber (Lee et al – Fig. 4 and col. 5, lines 50-60).

Regarding Claim 23: Lee et al teach that the cleaning gas is SF6 (a reactive gas) [col. 7, lines 35-40].

Regarding Claim 24: Fukuda et al teach a microwave is used during the cleaning process (col. 4, lines 35-40).

Claims 20, 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 6,857,388) in view of Fukuda et (US 5,449,411) and Zhao et al (US 2004/0144490) as applied to claims 19, 22-24 and further in view of Takahashi et al (US 5,520,743).

Regarding Claim 20: Lee et al in view of Fukuda et al and Zaho et al teach all limitations of the claim including that susceptor 66 is movable up/down and that second exhust port 58 is positioned lower than a surface of the substrate.

Lee et al in view of Fukuda et al and Zaho et al do not explicitly teach the first exhaust port is positioned higher than a surface of the substrate.

Takahashi teaches a substrate processing apparatus with a up/down movable substrate W and a first and second exhaust ports 32, 45 respectively, wherein the first exhaust port 32 is disposed higher than the substrate W (in its lowered position) [e.g. Fig. 1 and col. 2, line 35 to col. 4, line 30].

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the first exhaust port positioned higher than the a surface of the substrate as taught by Takahashi in the apparatus of Lee et al in view of Fukuda et al and Zaho et al to enable entry/exit of the substrate into the processing chamber.

Regarding Claim 25: Lee et al teach that inside of process chamber can be exhausted by the first and second exhaust ports 58, 60 when cleaning gas is introduced in the processing chamber (Lee et al – Fig. 4 and col. 5, lines 50-60).

Regarding Claim 26: Lee et al teach that the cleaning gas is SF6 (a reactive gas) [col. 7, lines 35-40].

Regarding Claim 27: Fukuda et al teach a microwave is used during the cleaning process (col. 4, lines 35-40).

Claims 21, 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 6,857,388) in view of Fukuda et (US 5,449,411) and Zhao et al (US 2004/0144490) and Takahashi et al (US 5,520,743) as applied to claims 20, 25-27 and further in view of Takagi et al (US 6,402,847).

Regarding Claim 21: Lee et al in view of Fukuda et al, Zaho et al and Takahashi et al teach all limitations of the claim (as already explained above under claims 19, 20) including that the substrate 64 can be moved up/down along with susceptor 66 that is movable in up/down direction (Lee et al – Fig. 4 and col. 5, lines 25-40), that first exhaust port is positioned higher than substrate surface during entry/exit of substrate (Takahashi – Fig. 1), and further that second exhaust port is positioned lower than the substrate surface during cleaning (Lee et al – Fig. 4).

Lee et al in view of Fukuda et al, Zaho et al and Takahashi et al do not teach substrate is moved up during plasma processing such that first exhaust port is positioned higher than the surface of the substrate.

Takagi et al teach a plasma processing method including a processing chamber 1 where the substrate is movable up/down during etching and cleaning operations. Takagi et al further teach that during dry processing, the distance between the shower head 7 and the lower electrode 2 is made to differ between the film forming operation and the cleaning operation and more specifically, during the cleaning operation, the distance is widened, that is, during processing the substrate is moved upward and during cleaning the same is downward. Takagi et al also teach that during processing the first exhaust port is positioned higher than the surface of the substrate, and a large amount of gas such as C.sub.2 F.sub.6 is allowed to flow. Takagi et al further teach that during substrate processing the substrate is moved upwards such that first exhaust port 12 is positioned higher than the surface of the substrate W (e.g. Figs. 1, 2 and col. 7, line 1 to col. 8, line 32).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to position the first exhaust port at a position higher than the substrate surface as taught by Takagi et al in the apparatus of Lee et al in view of Fukuda et al, Zaho et al and Takahashi et

al to provide a uniform flow of the process gas in the entire pumping channel, and also reducing the cleaning time.

Regarding Claim 28: Lee et al teach that inside of process chamber can be exhausted by the first and second exhaust ports 58, 60 when cleaning gas is introduced in the processing chamber (Lee et al – Fig. 4 and col. 5, lines 50-60).

Regarding Claim 29: Lee et al teach that the cleaning gas is SF6 (a reactive gas) [col. 7, lines 35-40].

Regarding Claim 30: Fukuda et al teach a microwave is used during the cleaning process (col. 4, lines 35-40).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

1) Yano (US 2002/0028566) teaches a method for processing a substrate, comprising: delivering said substrate 2 to be plasma-processed into a process chamber 1; introducing a process gas 4 into said process chamber while an inside of said process chamber is evacuated by a first exhaust port 8 in said process chamber; plasma-processing said substrate (operation # 201a – Fig. 2); and introducing, after said substrate is plasma-processed, a cleaning gas 5 into said process chamber while the inside of said process chamber is evacuated by the exhaust port 8 thereby cleaning the inside of said process chamber (operation # 201b- Fig. -2) {Figs.- 1-4 and para. 0004-0012, 0033-0039, 0047-0052, 0054-0058).

2) Salimian (EP 0751554) teaches a method for processing a substrate, comprising: delivering said substrate 82 to be plasma-processed into a process chamber 62; introducing a process gas 68 into said process chamber and exhausting the same by a first exhaust port 64 in

said process chamber; plasma-processing said substrate; and introducing, after said substrate is plasma-processed, a cleaning gas 66 into said process chamber and exhausting the cleaning gas by a second exhaust port 70 positioned lower than said first exhaust port in said process chamber, thereby cleaning the inside of said process chamber (e.g. Fig. 3 and page 4, line 30 to page 6, line 40).

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH K. DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/R. K. D./
Examiner, Art Unit 1792

/Karla Moore/
Primary Examiner, Art Unit 1792